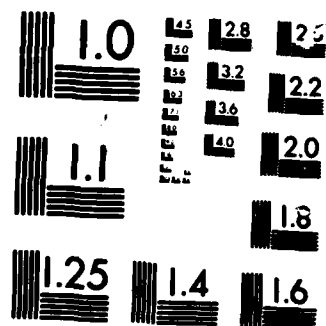AD-A166 200   THE DOD GATEWAY INFORMATION SYSTEM: PROTOTYPE   1/1
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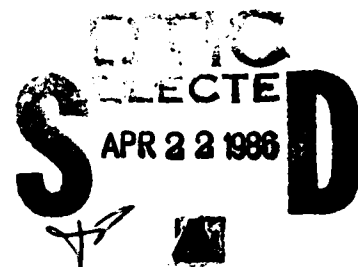
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THE DOD GATEWAY INFORMATION SYSTEM: PROTOTYPE EXPERIENCE

G. A. Cotter

April 1986

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The Department of Defense (DoD) Research and Engineering community requires rapid, easy access to scientific and technical information relevant to its mission. This information is contained in a multiplicity of databases maintained within the federal and commercial sectors. The DoD Gateway Information System (DGIS) is being developed to provide this community with a modern tool for accessing these databases and extracting information products from them.

DGIS is designed to provide the DoD researcher with a single, user-friendly system front-end that can be used to identify, access, interrogate, and post-process information from numerous databases. The DGIS transforms these database and processing resources into a single entity – a virtual database.

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The utility of DGIS will rest on the early acceptance and widespread participation of users, reactions encouraged by a design that makes quick learning and valuable results both possible and obvious. DGIS system development guidelines emphasize these design characteristics. The development effort is concentrated on integrating within a single, straightforward command structure the differing logic, syntax, and procedures intrinsic to separate databases. The design accommodates, transparent to the user, the complexities of accessing, downloading, merging, and processing information from diverse sources. This paper describes DGIS developments and evaluations to date.

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THE DoD GATEWAY INFORMATION SYSTEM:
PROTOTYPE EXPERIENCE

by

Gladys A. Cotter

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1. INTRODUCTION

The Defense Technical Information Center (DTIC), for many years, has been charged with collecting from, and disseminating to, the Department of Defense (DoD) research information and reports generated by DoD and its contractors. This has been accomplished, in part, through the development and maintenance of the Defense Research, Development, Test and Evaluation Online System (DROLS). Citations of technical reports produced by the DoD, up to the "Secret" level, are contained in DROLS and may be retrieved by remote users via terminal. Unclassified DROLS information is provided to the National Technical Information Service (NTIS) and made available to the public.

The DTIC mission recently was expanded to include facilitating DoD access to external Scientific and Technical Information (STI) databases, online services, and networks relevant to DoD Research and Engineering Programs. The STI sources are to include other federal, commercial, and foreign databases and systems. The objective is to provide DoD with the most up-to-date, pertinent information available, regardless of source.

To meet this additional mission, DTIC elected to develop the DoD Gateway Information System (DGIS), an intelligent gateway. This intelligent gateway is to provide a simple mechanism for matching information needs with information. The gateway is to provide users with answers to the questions:

WHAT RELEVANT DATABASES EXIST?
HOW DO I ACCESS THEM?
HOW DO I RETRIEVE INFORMATION?
HOW DO I MANIPULATE THE RESULTING INFORMATION?

Stated another way, DGIS is to provide a single, easy-to-use interface for identifying, accessing, interrogating, and post-processing information from numerous databases relevant to DoD information needs. Development of DGIS is a multi-year, multi-task project. This paper describes development of a prototype DGIS which currently is undergoing test and evaluation.

2. PROTOTYPE INGREDIENTS

Because the project's objective was intimidating, the initial fear was not failure, but never getting started. Failure, after all, is a tangible result which can be improved upon. The best approach seemed to be to identify several achievable objectives, to devise a plan to develop and implement a prototype system encompassing them, and to subject the results to test and evaluation. The basic components of the system were to be:

A DIRECTORY OF DATABASES - SUBJECT SEARCHABLE
A COMMON METHOD FOR ACCESSING AND SEARCHING DIVERSE DATABASES
TOOLS FOR DOWNLOADING AND POST-PROCESSING DATA

These components were to be encased in a simple, eloquent system. DGIS was to be designed for a DoD user community including both intermediaries and end users. Databases would be both federal and commercial. In addition to large, well-known databases and systems, many small, specialized DoD databases would eventually be part of the DGIS. Resources would be required to identify these databases within DoD and to establish announcement and access permission.

Having identified the broad requirements of DGIS, a software survey was conducted to determine if a software product already existed which would meet its needs. The survey showed that "THE" system was not out there, waiting (Ref. 1). One software package, the Technology Information System (TIS), did provide a suitable foundation on which to begin constructing DGIS (Ref. 2). TIS was under development at Lawrence Livermore National Laboratory (LLNL) under the sponsorship of the Department of Energy (DOE) (Ref. 3). TIS functioned as an

intelligent gateway, capable of interconnecting heterogenous information resources at geographically distributed locations in an automated, unified, and controlled manner. In addition, TIS downloading and post-processing capabilities were already available for selected databases.

Having identified in TIS a hospitable environment for testing DGIS concepts, a strategy for DGIS prototype design and development was based upon its capabilities.

3. PROTOTYPE DESIGN

Project teams were assigned to each of the DGIS major components: Directory of Databases, Interface(s) for Searching Diverse Databases, and Post-Processing Capabilities. Over the course of the project, teams were added for DGIS interface development, user support, and prototype implementation. Each of these areas is described below.

3.1 Directory of Databases

The goal of this project team is two-fold: 1) identify and catalog existing databases and 2) make this information subject-searchable, so that information needs can be matched to relevant resources (Ref. 4). Although there are many directories that identify commercial and prominent federal databases, such information was not readily available for DoD databases. To fill this void, a questionnaire was addressed to the DoD Research and Development (R&D) community to identify extant databases, their scope, and availability. Over 400 databases were identified as a result (Ref. 5).

The next step was to build a database of DoD and DoD-relevant databases which had been identified. A user survey was conducted to determine database requirements (Ref. 6). A database schema was developed for the Directory and database entries were subject indexed. The database was built using the INGRES relational database management system.

The result of this effort is a small-scale, online Directory of Databases which contains information on the content, scope, and availability of selected databases. The Directory is subject-searchable, so that upon entering the topic of interest, the user is provided with a list of appropriate databases.

3.2 Interface for Searching Diverse Databases

One of the primary goals of DGIS is to relieve the user of the need to learn and master separate commands and protocols for each database accessed. As mentioned earlier, the DGIS target user community includes both end users and intermediaries. It is a rare intermediary who maintains proficiency in the use of more than ten systems and, for end users, two systems is high (Ref. 7). With the ongoing proliferation of databases, it is obvious that both end users and intermediaries will benefit from an interface for searching diverse databases. The project team assigned to this effort found that end user and intermediary interface needs are very different when considered in conjunction with today's technology. (An expansive natural language interface requiring artificial intelligence applications appealed to both populations, but could not be accomplished with existing technology in the short term.)

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A dual approach was adopted for the interface design, incorporating
separate strategies for intermediaries and end users. Eight database systems
were selected for inclusion in the prototype model. These included three large
federal systems and two small DoD systems.

A software survey was conducted to determine if interfaces existed which
met DGIS needs. One of the "needs" that influenced the result of this survey
was the requirement to support low-end, "dumb" termina. service on DGIS, as well
as intelligent devices. Many of the software packages identified were designed
for a microcomputer environment and had to be ruled out for use in the
prototype. As a result of the survey, a decision was made to develop an
interface for the intermediary and to integrate an existing interface for the
end user.

For the intermediary, a command translator is being developed which allows
the user to interact with any of the test systems using the command language he
selects. The user, for example, could search NASA/RECON using DROLS commands or
the reverse. Since some commands will not have an equivalent in another
database, native command searching will be retained. This development work is
being performed at LLNL under the sponsorship of DoD and NASA.

To satisfy the end user, the EasyNet database searching service has been
integrated into DGIS. EasyNet is a menu-driven, database front-end which
provides access to over 600 commercial databases. This service was tested by
members of the DoD end user community who delighted in the simplicity of search
execution. EasyNet access is now an option within DGIS.

3.3   Post-processing

Information retrieved from databases often requires analysis or
post-processing in order to become useful to the researcher. This need had been
recognized by DOE and they had developed many options for post-processing data
from DOE/RECON through TIS. A library of post-processing routines for numeric
and bibliographic data was available on TIS software and was incorporated in the
DGIS project (Ref. 8). In order to post-process data, the user downloads it
into a file on DGIS, translates the data into a common format, and calls up one
of the many available post-processing routines.

The post-processing team tested existing post-processing capabilities,
made recommendations for enhancements, and prioritized expansion of the
capabilities to other databases.

3.4   DGIS User Interface Design

The interface incorporated in TIS software was structured to support users
with a knowledge of the UNIX operating system. As a rule, the DGIS user
community lacked this knowledge and was not inclined to invest the time required
to acquire UNIX expertise. However, TIS software has a flexible design which
allows the user interface to be tailored to the target user community (Ref. 9).

The team responsible for developing the DGIS interface incorporated menu
and command modes into the interface (Ref. 10). The objective was to allow the
novice user to interact with the system at ease, by descending through a series
of menus. For the more experienced user, commands were incorporated to execute
systems functions.

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3.5 Prototype Implementation

Initial DGIS development, test and evaluation took place on TIS software at LLNL. DTIC sponsored a number of DoD users who agreed to test DGIS capabilities being developed at LLNL and make recommendations for system enhancements. These users were issued passwords and dialed into TIS at LLNL.

In parallel, the prototype implementation team developed a plan for acquiring the hardware, software, and telecommunications equipment required to support a DGIS prototype in the Washington, DC, area. A site was selected and installation was accomplished in February 1986. The prototype is running on a VAX 11/780 using the UNIX operating system and INGRES database management system.

3.6 User Support

As implementation and testing of the various DGIS modules began, it became obvious that success of the system would require some form of user support and training. A Gateway User Support and Training Office (GUSTO) was established to satisfy this need. GUSTO provides a hotline service which users can call when they have a problem. GUSTO staff will identify the source of the problem (i.e., the gateway, the user's terminal, a telecommunications link, a remote system, etc.) and take action to have the problem resolved. Users may also contact GUSTO staff utilizing an electronic mail capability which is available on DGIS.

Developing a user's manual and providing training courses are also GUSTO responsibilities. The training course is primarily designed for the professional searcher who wants to exercise the power of the system, especially in the area of post-processing of bibliographic data. The user's manual serves as a reference tool for the user. GUSTO staff will also poll the DGIS user community to identify new requirements.

4. STATUS

The prototype DGIS is currently undergoing test and evaluation within the DoD community. Thirty users have been selected to participate in the prototype evaluation. The group is comprised of end users and intermediaries.

Testing of DGIS began in March 1986 and will continue for a 12-month period. Currently, in the first month of prototyping, the major effort has been devoted to correcting a series of minor, but continuous, hardware and software problems. This has provided an opportunity to gain a first-hand knowledge of the "burn-in period" and "infant mortality."

Once these problems have been solved, the users will be brought onboard and the design teams will begin collecting data on the performance of their modules. System modification and fine tuning will take place to enhance performance. Six months into the prototype period, data will be collected on overall system ease of use and productivity improvements.

Success of the prototype will result in its operational implementation and expansion of the number and type of databases accessible through DGIS. Implementation of DGIS will provide DoD's scientific and technical community with a powerful, responsive information tool. DGIS will render timely, comprehensive information to DoD research, development, and engineering programs. The productivity enhancement within the community resulting from this information will more than offset the investment made in DGIS development and operating cost.

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